AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

Claim 1 (Currently Amended): A method of designing a magnetic field gradient coil assembly using wound inner and outer coils, said method comprising the steps of:

setting or resetting the number of said inner coils and optimizing their positions such that a resulting magnetic field strength falls within a tolerable range of a target magnetic field gradient under shielded conditions;

setting or resetting the number of said outer coils and the number of turns of each outer coil;

calculating Fourier components of an electric current spatial distribution necessary for the outer coils;

optimizing positions of the outer coils to approximate the Fourier components of the current distribution;

calculating magnetic fields leaking from the inner and outer coils, respectively;

calculating magnetic field distortions caused by eddy currents at the outside of said outer coil produced by the leaking magnetic fields; and

resetting the number of the outer coils and the number of turns of each outer coil such that the magnetic field distortions caused by eddy currents fall within a tolerable range.

Claim 2 (Previously Presented): A method of designing a magnetic field gradient coil assembly as set forth in claim 1, wherein said step of setting or resetting the

number of said inner coils and optimizing their positions such that a resulting magnetic field strength falls within a tolerable range of a target magnetic field gradient under shielded conditions uses a Green's function.

Claim 3 (Previously Presented): A method of designing a magnetic field gradient coil assembly as set forth in claim 1, wherein said step of calculating Fourier components of an electric current distribution necessary for the outer coils uses a Green's function.

Claim 4 (Original): A method of designing a magnetic field gradient coil assembly as set forth in claim 1, wherein said step of optimizing the positions of the outer coils to approximate the Fourier components of the current distribution performs the approximation using a small number of tightly wound coils.

Claim 5 (Previously Presented): A method of designing a magnetic field gradient coil assembly as set forth in claim 1, wherein said step of calculating magnetic fields leaking from the inner and outer coils, respectively, and said step of calculating magnetic field distortions caused by eddy currents produced by the leaking magnetic fields use a Green's function.

Claim 6 (Original): A method of designing a magnetic field gradient coil assembly as set forth in claim 1, wherein said step of resetting the number of the outer coils and the number of turns of each outer coil if the magnetic field distortions are outside the tolerable range, said step of calculating Fourier components of an electric current distribution necessary for the outer coils, said step of optimizing the positions of the outer coils to approximate the Fourier components of the current distribution, said step of calculating magnetic fields leaking from the inner and outer coils, respectively, and said step of calculating magnetic field distortions caused by eddy currents produced by the leaking

magnetic fields are repeatedly carried out to determine optimum conditions for the outer coils by trial and error.

Claim 7 (Previously Presented): A magnetic field gradient coil assembly having wound inner and outer coils, said magnetic field gradient coil assembly having been designed by a method comprising the steps of:

setting or resetting the number of said inner coils and the number of turns of each inner coil and optimizing their positions such that a resulting magnetic field strength falls within a tolerable range of a target magnetic field gradient under shielded conditions;

setting the number of said outer coils and the number of turns of each outer coil;

calculating Fourier components of an electric current spatial distribution necessary for the outer coils;

optimizing positions of the outer coils to approximate the Fourier components of the current distribution;

calculating magnetic fields leaking from the inner and outer coils, respectively; and

resetting the number of the outer coils and the number of turns of each outer coil such that the magnetic field distortions caused by eddy currents fall within a tolerable range.

Claim 8 (Previously Presented): The magnetic field gradient coil assembly of claim 7, wherein said step of setting or resetting the number of said inner coils and optimizing their positions such that a resulting magnetic field strength falls within a tolerable range of a target magnetic field gradient under shielded conditions uses a Green's function.

Claim 9 (Previously Presented): The magnetic field gradient coil assembly of claim 7, wherein said step of calculating Fourier components of an electric current distribution necessary for the outer coils uses a Green's function.

Claim 10 (Previously Presented): The magnetic field gradient coil assembly of claim 7, wherein said step of optimizing the positions of the outer coils to approximate the Fourier components of the current distribution performs the approximation using a small number of wound coils.

Claim 11 (Previously Presented): The magnetic field gradient coil assembly of claim 7, wherein said step of calculating magnetic fields leaking from the inner and outer coils, respectively, and said step of calculating magnetic field distortions caused by eddy currents produced by the leaking magnetic fields uses a Green's function.

Claim 12 (Original): The magnetic field gradient coil assembly of claim 7, wherein said step of resetting the number of the outer coils and the number of turns of each outer coil if the magnetic field distortions are outside the tolerable range, said step of calculating Fourier components of an electric current distribution necessary for the outer coils, said step of optimizing the positions of the outer coils to approximate the Fourier components of the current distribution, said step of calculating magnetic fields leaking from the inner and outer coils, respectively, and said step of calculating magnetic field distortions caused by eddy currents produced by the leaking magnetic fields are repeatedly carried out to determine optimum conditions for the outer coils by trial and error.